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Part 1

Warfighter Forum

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In support of the Army's Title 10 Wargame Unified Quest 2010, U.S. Army Space and Missile Defense Command/Army Strategic Forces Command (USASMDC/ARSTRAT) conducted a Warfighter Forum devoted to gaining direct insights into warfighters' dependencies on space-enabled capabilities such as communications; positioning, navigation, timing; Imagery, and friendly-force tracking. The Warfighter Forum is one of several analytic events in the Chief of Staff of the Army's Unified Quest 2010 Campaign of Learning. During the event the support team collected observations and developed insights and recommendations that will feed USASMDC/ARSTRAT's Space Power Seminar Wargame on "Denied, Degraded, Disrupted Space Operations Environment" (Feb. 10) and the Army's Unified Quest 2010 Future Game (May 2010).

USASMDC/ARSTRAT's Warfighter Forum event was conducted Dec. 8-9, 2009 in Colorado Springs, Colo., to leverage the availability of combat units at nearby Fort Carson. The primary participants for the facilitated discussions were members of 4th Infantry Division and 10th Special Forces Group. Subject Matter Experts from the command and mission partner space organizations were invited to enhance our discussions. The two-day event provided valuable inputs and the established over-arching objectives were achieved. Based on our observations and how well the Warfighter Forum was received by participants, recommend USASMDC/ARSTRAT institutionalize the event by reaching out to other combat organizations across the Army to properly inform space concepts and capabilities and prepare the Army for the future.

The Forum focused on one of the Chief of Staff of the Army's Unified Quest 2010 key tasks: "Determine how to protect or mitigate the loss of space, cyber, and network-related capabilities." As the U.S. Army prepares to fight in a complex and uncertain future operating environment in a more decentralized manner we need to understand space dependencies and

vulnerabilities to assist the warfighter and identify how space-enabled capabilities need to evolve to improve support. The observations made and insights gained from the Warfighter Forum will contribute to the command's Denied, Degraded, Disrupted Space Operations Environment Seminar Wargame, follow-on Unified Quest 2010 wargaming events and ultimately to improve the ability of Army forces to plan and execute full-spectrum operations.

The outcome of this Warfighter Forum highlighted the critical value of assured access to Satellite Communications and Position, Navigation and Timing, to tactical operations. Equally important insight was gained regarding the growing need to train and educate Army leaders, at all levels, on the threats, vulnerabilities, and mitigation strategies necessary to continue operations in a degraded space and cyber operations environment.

PURPOSE

This is the final report from the Warfighter Forum. Included are the forum context, the event objectives, consolidated insights, and recommendations.

BACKGROUND

After participating in several U.S. Air Force and Joint space-oriented wargames that focused on strategic and national-level space policy issues, USASMDC/ARSTRAT recognized the need to conduct a Space Seminar Wargame oriented at operational and tactical levels and focused on identifying new concepts and capabilities that affect future land warfighters' access to critical space capabilities. In February 2009, USASMDC/ARSTRAT conducted its first Army space and cyber Seminar, an excursion event within Unified Quest 2009, to determine what space, high altitude, and cyber capabilities are required to enable Army and Joint Forces Commanders to dominate future operational environments. Key findings from last year's event included:

- **Assurance**

Assured communications, position and navigation, and intelligence, surveillance and reconnaissance must rely on a layered architecture of terrestrial, aerial, high altitude, and space-based systems.

- **Materiel Systems**

The capability of Army and joint force commanders to exploit space-based capabilities is limited by the availability of materiel systems that provide access to satellite systems

- **Network**

The effects of network degradation on operations are potential force vulnerabilities

- **Tiered Architecture**

A tiered architecture of space-based capabilities is required. Full-spectrum operations of the future will be no less reliant on space-based technologies than warfighters today depend on space; a layered architecture of space, high altitude, aerial, and terrestrial platforms can only strengthen access to command and control, position, navigation and timing, and Intelligence, surveillance and reconnaissance capabilities.

USASMD/ARSTRAT will use the findings gained from last year's learning campaign events to inform the design and objectives of the Fiscal Year 2010 wargame activities. This includes using the insights and results of relevant efforts including the Space Force Mix Assessment, the Space and Network Assessment Capabilities-based Assessments, and the Tactical Space Protection Study. Early in planning for the Fiscal Year 2010 campaign, the team realized the value of conducting a straightforward event to gain inputs directly from warfighters with recent theater-of-war experience on the topic of tactical space dependency while operating in degraded space environments. The Warfighter Forum is designed to achieve that aim.

METHODOLOGY FOR WARFIGHTER FORUM

1. For the development of Warfighter Forum objectives the team identified key tasks from Chief of Staff of the Army intent for 2010 Campaign of Learning. The primary task was, "Determine

how to protect or mitigate the loss of space, cyber, and network-related capabilities." From this primary task and others the wargames team developed three objectives that were oriented to maximize the wargame utility and the opportunity to gain recent and relevant warfighter experiences and insights.

- Understand the requirements for effective decentralized operations against hybrid threats in the emerging operational environment.
 - Evaluate Leader Development Strategy and refine our understanding of how to develop the knowledge, skills, and abilities that Army leaders require to accomplish future missions.
 - Based upon global trends and analysis of alternative futures, identify capabilities that will enable Army operations in the mid to long term.
2. Each day during the Warfighter Forum the predominant period of time was committed to discussions with tactical level warfighters. Day one was devoted to the 4th Infantry Division and day two to the 10th Special Forces Group. The seminar discussed the three objectives during the half-day sessions. Each session was led by facilitators who steered discussions to Army space-related objectives and their impacts on operations. During each session warfighters and Space Mission Area Experts discussed their recent operational experiences in addressing questions posed by facilitators. In addition a six-question survey was provided to the participants and was also used in developing the final insights and recommendations.

PARTICIPANTS

Participants from the 4th Infantry Division and 10th Special Forces Group staffs as well as Subject Matter Experts with specific joint and Army space backgrounds attended the Warfighter Forum. Analysis focused on responses from 4th Infantry Division and 10th Special Forces warfighters; Subject Matter Experts enhanced discussions related to primary objectives and study questions. Participant lists are available upon request.

INSIGHTS AND RECOMMENDATIONS

OBJECTIVE 1 Understand how space-enabled capabilities support decentralized operations against hybrid threats in the current and future operational environment.



Sandra Yanna of the Future Warfares Center Battle Lab fields a question from a conference attendee.

Insight 1. Assured communications and positioning, navigation, and timing are the Space Force Enhancement capabilities that tactical warfighters depend on most—predominantly to execute the warfighting functions of command and control, maneuver, and fires. Signals intelligence was highlighted as a capability area of increasing utility to planning and conducting tactical operations.

Discussion. To effectively operate in a decentralized environment, warfighters require beyond-line-of-sight communications and positioning, navigation and timing. Users require satellite communications as a means to have uninterrupted, on-the-move communications in all environments as well as securing access to valuable reach-back products and services. Space can provide beyond-line-of-sight and over-the-horizon communications that facilitate command and control, provide reach-back to organizations (even while on the move), enhance targeting (especially with signals intelligence and situational awareness) and receive appropriate authorizations for execution of operations. Regarding positioning, navigation and timing capabilities, the warfighter must have systems timing and a required level of situational awareness for maneuver and command and control of forces. In addition, positioning, navigation and timing capabilities provided by space-based GPS enables integrated and responsive precision guided fires to protect friendly and defeat enemy forces.

Recommendation. USASMDC/ARSTRAT use this finding to inform the Space Capabilities Based Assessment (in progress)

and support force mix assessments to identify communications requirements from terrestrial to space domains. This information should also be used to prioritize work on tactics, techniques and procedures that, when developed, will support operations in degraded space and cyber environments. Finally, this information should be shared with the Army Signal Center for work on Aerial Layer initiatives.

Insight 2. Use of a “P.A.C.E.” (Primary, Alternate, Contingency, and Emergency) framework is an effective way to mitigate the degradation or loss of system/device capabilities in a high tempo tactical environment.

Discussion. Successful mission operations frequently hinges on the effective employment of systems and equipment that support the elements of combat power. Too often missions are terminated or unacceptable losses are suffered as a result of single points of failure or an over-dependence on equipment or systems. During the Warfighter Forum a “P.A.C.E.” approach to mission planning, training and execution was suggested as a proven way to mitigate equipment or system loss or degradation. When fully incorporated this tactic, technique and procedure accommodates operational adaptability and avoids single point failure scenarios. This approach can be especially effective in dealing with the most prominent threats (e.g., environmental interference, blue-on-blue fratricide, equipment problems) which are non-hostile in nature.

Recommendation. USASMDC/ARSTRAT advocate the Army adopts the P.A.C.E. model in leader development and training. The P.A.C.E. model is a way to identify single points of failure and continue to operate in degraded environments. Incorporate this lesson in developing degraded space and cyber tactics, techniques and procedures. USASMDC/ARSTRAT should work with U.S. Training and Doctrine Command to ensure that the P.A.C.E. concept is also integrated into doctrine. Ensure P.A.C.E. becomes part of the mandatory instruction for Army Space and Cyber Operations Officers and integrate into career-field training.

Insight 3. Forces are generally unaware of enemy threats to space-based systems but are becoming more aware of blue on blue electro-magnetic interference and impacts.

Discussion. There were very few examples of enemy threats to space-based capabilities presented during the forum. Representatives stated that during recent deployments they did not encounter any intentional threats against their systems.



A conference attendee gets animated while discussing warfighter issues.

However, they are becoming more aware of the blue-on-blue unintentional interference on communications systems and subsequent impacts to operations. Some participants also indicated a concern for effective Foreign Intelligence Services monitoring and collecting data on friendly operations and tactics, techniques and procedures.

Recommendation. The assignment of frequency managers at division level has become a significant resource concern. Divisions should ensure they have trained frequency managers who are capable of deconfliction. The frequency manager needs to be assigned to a division prior to deployment and must participate in the unit's Mission Rehearsal Exercise. The Division Force Protection and SSE need to remind users to follow established tactics, techniques and procedures and be cognizant of FIS presence.

Insight 4. The established space-based operational environment currently in theater will degrade as Army general purpose forces transition out of theater, putting remaining Army and joint forces at risk, especially Special Operations Forces who have become reliant on more robust, mature space-based capabilities.

Discussion. As Army general purpose forces transition (down-size) the operational risk to remaining forces (e.g., SOF) is increased due to diminished space infrastructure and capabilities. Special Operations Forces and remaining forces usually rely on established networks and intelligence, surveillance and reconnaissance functions to assist deliberate planning and mission execution; and when Security Force Assistance efforts expand, their requirements for space-enabled capabilities will likely increase. Meanwhile, as Brigade Combat Teams and higher-level units transition from host nations, they will take their resources with them, including space-enabled assets, along with communications and intelligence processes. This situation puts remaining U.S. forces at risk of mission failure.

Recommendation. USASMDC/ARSTRAT work with U.S. Strategic Command and Special Operations Command to develop exit strategies and identify options for augmentation for communications, intelligence, surveillance and reconnaissance, and Special Technical Operations for Special Operations Force. Recommend that the Space Operations Officers Qualification Course train FA40s to conduct operational risk assessments. As Army Divisions transition the Space Support Element teams will conduct the risk assessment to minimize leaving behind a degraded space force enhancement environment.

Insight 5. Space Force Enhancement support requirements for tactical echelons operating under decentralized conditions must be informed by organizational, knowledge management, and risk assessments.

Discussion. Generally, the group felt that the number of established and emerging capabilities, mostly intelligence capabilities, delivered and integrated at Brigade Combat Team and below, exceeded current analyst manpower and operational capacity. The result of pushing more space-enabled intelligence capabilities than tactical echelons are manned and equipped to absorb results in information overload, lack of thorough analysis, and inefficient use of space-enabled capabilities. Further complicating tactical intelligence support during decentralized operations is the collection management process which is overly bureaucratic, inflexible, and unresponsive to urgent and dynamic tactical requirements.

Recommendation. Using the brigade organizational template, USASMDC/ARSTRAT in concert with the Signal and Intelligence centers, examine the space-enabled capabilities most suitable for use and exploitation at tactical-unit levels. The resultant assessment should be used to inform appropriate U.S. Training and Doctrine Command Centers of Excellence and the Army space operations community efforts in equipping and designing force structure.



Forces are generally unaware of enemy threats to space-based systems but are becoming more aware of blue on blue electro-magnetic interference and impacts.

Insight 6. Too often units are training to a “Same Mission and Environment” scenario for follow-on deployments, resulting in limited opportunities to train with a less robust infrastructure or in degraded environments. Units are not training for a degraded operational environment in their continental United States pre-deployment events.

Discussion. Leaders from units that participated in the Warfighter Forum indicated they do not receive sufficient space capabilities while training in the continental United States. The training conducted is focused on the communications networks that are established in theater and there is little or no exposure to training with a less robust infrastructure or for operations in degraded environments. This approach to pre-deployment training does not account for unanticipated changes in the environment, nor does it emphasize or integrate “operational adaptability,” the foundation of the Army’s Future Force Capstone Concept.

Recommendation. USASMDC/ARSTRAT Future Warfare Center aggressively solicit ideas from Space Operations Officers and mission partners and use these inputs to develop vignettes/modules that support operational adaptability and training for degraded space and cyber environments. Dissemination of these vignettes and training ideas should be shared via web-based sites so lessons learned can be more readily developed to advance training programs and shared across the force.

Insight 7. Space Force Enhancement capabilities and support to Special Operating Forces in the continental United States are inadequate.

Discussion. Special Operations Forces in the continental United States do not have access to space-enabled capabilities while training and resetting there. The only time these forces have access to and employ space-enabled capabilities is during deployments abroad. This shortfall inhibits sharpening and

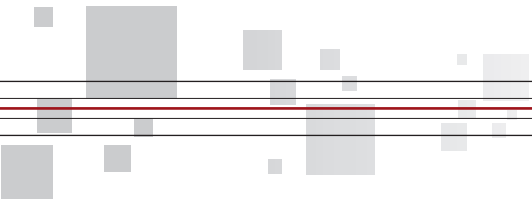
maintenance of skills, slows new tactics, techniques and procedures development and testing, and dilutes training environments and opportunities. Although anecdotal, the fact that 10th Special Forces Group did not have dedicated Satellite Communications access during a real-world (and recent) helicopter recovery mission, lost several valuable hours trying to coordinate for Satellite Communications support, and had to eventually piggy-back off of 4th Infantry Division Satellite Communications support in order to conduct search and recovery mission in the Pike National Forest demonstrates the impact of this deficiency.

Recommendation. USASMDC/ARSTRAT, through U.S. Strategic Command, partner with and advocate for U.S. Special Operations Command space-enabled training requirements regardless of force location.

OBJECTIVE 2 Better understand leader knowledge of space-enabled dependencies and vulnerabilities; recommend ways to improve Army leader development strategies.

Insight 1. A greater degree of specialized space training for combat arms leaders is not necessary; leveraging and uniting organic and external subject matter experts is a suitable way to ensure Army leaders understand and account for space dependencies, vulnerabilities and mitigation measures.

Discussion. Most participants felt that a better understanding of space dependencies and vulnerabilities could be achieved without additional specific educational courses and training for Army leaders. Effectively employing personnel with the requisite space skills and education and integrated space operations are effective ways to ensure combat arms leaders are equipped to deal with uncertain and complex environments, including



contested space. This becomes very important at the Brigade Combat Team level when they do not deploy with their parent headquarters. Brigade Combat Team leaderships need to be aware of resident space professionals and space force enhancement capabilities. It was evident that Special Forces units and leaders have demonstrated the success of this approach; individual specialized skills have been inculcated and have resulted in effectively integrating specialized space systems and capabilities to support mission accomplishment.

Recommendations. 1. Space Support Elements at division need to execute an engagement plan with Brigade Combat Teams to provide space training on capabilities and tactics, techniques and procedures to ensure space is integrated into tactical level operations. 2. Recommend USASMD/ARSTRAT leadership monitor efforts to get FA40s to all the Special Forces Groups and the potential integration of Air Force Space Officers into division. These individuals will assist with space integration and planning but also ensure units receive recurring training on space capabilities.

OBJECTIVE 3 Identify space-enabled capabilities that can enable Army operations in the mid to long term.

Insight 1. Warfighters should strive for functional solutions to bandwidth problems that include user discipline and the ability to manage large data sets more effectively.

Discussion. The need for greater space-enabled communications bandwidth is an existing gap and will remain a gap for years to come. Technological advances may very well increase bandwidth capacities. At the same time, however, we should expect the demand for greater bandwidth will also increase. Since there is no end in sight for this capability gap, warfighters should not rely only on future technologies to fill the gap. Instead warfighters need to understand this problem and use demonstrated and available solutions to overcome overburdened bandwidth. User discipline (use only the necessary bandwidth for essential needs), management of the electromagnetic spectrum and use of proven Large Data dissemination solutions should help alleviate bandwidth stress.

Recommendation. USASMD/ARSTRAT continue to work closely with 4th Infantry Division, 10th Special Forces Group, and other warfighting units to emphasize user discipline and introduce them to products and services such as the “Large

Data” Joint Capability Technology Demonstration which is currently being led by U.S. Strategic Command. USASMD/ARSTRAT advocates that U.S. Training and Doctrine Command and U.S. Army Signal Center continue to identify solutions for the compression and prioritization of data.

Insight 2. Warfighters frustrated by degraded space-enabled ground systems often turn to flawed tactics, techniques and procedures/workarounds during the fog and friction of tactical warfare, often leading to negative conditioning and repetitions of system failure.

Discussion. Warfighters reported that, frequently, when space-enabled capabilities are denied, degraded, or disrupted, they often applied “quick fixes” or discontinued use of systems altogether without really understanding the source of degradation. This practice leads to negative conditioning—habitually employing imperfect tactics, techniques and procedures/standard operating procedures—in operating environments where characterization and identification of system interference could actually lead to more efficient operational environments and mission success. Space enabled ground systems that could self-detect, characterize, and report interference would alert the user to interference more quickly, lead to better situational awareness, and would block flawed work-around procedures.

Recommendation. Future space-enabled ground systems should be developed as “smart” systems that are able to self-detect, characterize, and report system degradation and interference. Future Warfare Center should work closely with appropriate U.S. Training and Doctrine Command Capabilities, Development Integration Directorate, the Space and Missile Defense Command Technical Center, and other organizations to help modify current space-ground systems and develop smarter future systems. The Space and Missile Defense Battle Lab should include this finding into future Capability-Based Assessments and subsequent Army Space acquisition processes.

SUMMARY

USASMD/ARSTRAT’s Warfighter Forum was a successful event that provided valuable insights in supporting Army efforts to determine how to better understand the future operational environment, prepare leaders and protect or mitigate the loss of space, cyber, and network-related capabilities. The superb support provided by 4th Infantry Division and 10th Special Forces Group leaders enabled the command’s Future Warfare Center Wargames Division to obtain tactical level warfighter inputs based on recent Operation Iraqi and Operation Enduring Freedom experiences. Insights from this event will inform two

key future wargame activities: USASMDC/ARSTRAT's Space Power Seminar (Feb. 2010) and the Army Unified Quest Future Game (May 2010).

In addition to satisfying the wargame objectives, added benefits were derived in identifying leader development needs and bridging the gap between operating forces and generating forces. This brief event has already led to useful partnership initiatives that are underway to leverage responsive development support and space mission area expertise.

Direct warfighter participation and simple design for the Warfighter Forum demonstrated real value with negligible time and cost impacts. Pursuing similar models for future wargame activities will contribute to needed engagements between the concept-capabilities development and experimentation communities and warfighters and will better prepare the Army for an uncertain and complex future.

FOR FURTHER EXAMINATION

Additional Discussion. We deleted a section from Objective 1, Insight 1 Discussion narrative that contrasted the feedback gained from last year's Space Power Seminar Wargame and our Warfighter Forum on the "most vital" space-enabled capabilities (satellite communication and positioning, navigation and timing more vital than satellite communication and intelligence, surveillance and reconnaissance). We did so because 1) we felt we had taken the analysis too far and had inferred too much, and 2) we needed to economize the narrative. This is, however, a data point worth noting and exploring in the future. The deleted section read:

This insight reflects a noticeable difference from last year's [seminar] wargame assessment that concluded communications and intelligence, surveillance and reconnaissance were the most vital space enabled capabilities. This is most likely due to assessing this question at the tactical level of war where tactical warfighters have increasing access to satellite communications and Global positioning system, [space-enabled systems] integrated into virtually all tactical systems. [There remains, however,] shortfalls in delivering responsive and on-the-move access to space-based ISR.

Recommend we revisit the comparison-contrast and users' differing priorities of space-enabled capabilities at a future time. This could become a sub-question of Objective 3, Mitigation Strategies, for the Denied, Degraded, Disrupted Space Operations Environment Seminar Wargame, and we will consider this data point an option within the Data Collection and Analysis Plan.

Deferred Insight from Objective 1

The following insight was removed from Objective 1. We determined that we did not gather enough data from the Warfighter Forum to include in the final document. However, this is a major concern that resonates in all theaters--from training exercises to combat operations. We elected to consider this insight as a topic to include in our Denied, Degraded, Disrupted Space Operations Environment wargame.

Insight. Deploying units need to plan for the space-based effects and potential capabilities that they need to leave behind as they conduct transition of authority to host nations.

Discussion. U.S. Army Forces are currently training indigenous forces to be self-reliant and proficient with mission planning and targeting. As units begin to transition out they need to leave behind equipment that aided in the military planning process. However, access to and proficiency in space-enabled capabilities, data sharing, and data-sharing processes left behind to Host Nation Forces is a concern to warfighters. Most of the data shared with coalition partners and Host Nation Forces is unclassified and is normally received from commercial sources. When Host Nations are provided systems and training, their ability to use and maintain these capabilities diminishes because of technical challenges, maintenance issues (lack of funding), and no continuity training.

Recommendation. USASMDC/ARSTRAT work with U.S. Strategic Command and Air Force Space Command to resolve "release-ability" limitations when providing intelligence products to our coalition partners. Units deployed during stability operations need to develop long-term training plans for Host Nations Units and determine what realistic capabilities that can be left behind. 